METHOD FOR MANIPULATING OBJECTS ON A COMPUTER DISPLAY

BACKGROUND OF THE INVENTION

The present invention relates generally to manipulating images on a computer screen, and more particularly, to methods of rotating, scaling and otherwise altering the image of an object on the screen using an icon-based tool.

As the use of computers becomes more widespread throughout society, greater emphasis is placed on the user interface. One popular approach to simplifying the user interface is to display various graphical items on the computer's display screen. The displayed items commonly take the form of icons, menus and/or windows. When the user desires to perform or initiate a task represented by the displayed item, the user merely selects the icon or the like representing the desired task.

In graphics applications, it is often desirable to manipulate images displayed on the screen of a computer system. For example, a user may wish to rotate or scale (size) an image. Commonly, these functions are accomplished by selecting the items to be manipulated and then entering a suitable keyboard command that indicates the angle by which the image should be rotated, or the factor by which the image should be scaled. Alternatively, some applications require that the user choose the desired scaling or rotation function from a menu and then "stretch" or "rotate" the items through the use of a screen pointer which grabs a "gravity point" or "handle" on the selected item and then scales or rotates the image as a function of the pointer's movement. While such approaches have worked suitably in the past, there are continuing efforts to simplify the user interface, especially for inexperienced users, who often find it difficult to remember which commands or operations are required to conduct a particular operation.

SUMMARY OF THE INVENTION

Accordingly, one of the primary objects of the present invention is to provide a graphical user interface that facilitates easy manipulation of objects displayed on a computer display assembly.

To achieve the foregoing and other objects and in accordance with the purpose of the present invention, a method for manipulating a selected object on a computer display of a computer system using a screen based icon and a pointing device is disclosed. The method includes the step of selecting a manipulating tool icon having a designated mark for its center of rotation. The pointing device is directed towards a portion of the manipulating tool that is spaced apart from the designated mark. The pointing device is then used to rotate the spaced apart portion of the manipulating tool about its designated mark. The computer system then manipulates the selected object by an amount that is a function of the angular distance that the spaced apart portion of the manipulating tool is rotated about the designated mark.

In a preferred embodiment of the invention, the manipulating tool takes the form of a screen based crank icon having an "axle" portion that functions as the designated mark and a "handle" portion that functions as the spaced apart portion. In a further embodiment, the crank icon can be used to rotate the selected objects. In such an embodiment, the axle is preferably positioned at the desired center of rotation of the selected object. The handle is then rotated about the axle by the user and the selected object is rotated about the axle by an amount that is a function of the angular distance the handle was rotated about the axle.

In a product aspect of the invention an improved user interface that includes the screen based crank icon is disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings in which:

FIG. **1** is a block diagram of a pen-based computer system that incorporates the present invention.

FIG. **2** is a pictorial representation of the screen of a computer display assembly that incorporates the present invention.

FIG. **3** is a pictorial representation of the screen of the computer display assembly shown in FIG. **2**, with the toolbox window displayed.

FIG. **4** is a pictorial representation of a crank icon suitable for use with the present invention.

FIG. **5** is a flow diagram of a method of determining whether the toolbox has been selected.

FIG. **6** is a flow diagram of a method of determining which tool in the toolbox has been selected.

FIG. **7** is a flow diagram of a method of determining the operation which the user wishes the crank to perform.

FIG. **8** is a flow diagram of a method of determining which crank button the user has selected.

FIG. **9** is a flow diagram of a method of determining the current action to be performed by the crank.

FIG. **10** is a flow diagram of a method of dragging the crank.

FIG. **11** is a flow diagram of a method of rotating an object in accordance with the present invention.

FIG. **12** is a flow diagram of a method of scaling an object in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is particularly well suited for pointer based computer systems such as the pen-based, stylus-based and mouse driven systems that are currently popular. For the purposes of illustration, the invention will be described in connection with a pen-based system.

As shown in FIG. **1**, a pen-based computer system **10** in accordance with the present invention includes a central processing unit (CPU) **12**, read only memory (ROM) **14**, random access memory (RAM) **16**, input-/output (I/O) circuitry **18**, and a display assembly **20**. The pen-based computer system **10** may also optionally include a mass storage unit **22** such as a disk drive unit or nonvolatile memory such as flash memory, a keypad **24**, and a clock **26**.

The CPU **12** is preferably a commercially available, single chip microprocessor. While CPU **12** can be a complex instruction set computer (CISC) chip, it is preferable that CPU **12** be one of the commercially available, reduced instruction set computer (RISC) chips which are known to be of generally higher performance than CISC chips. CPU **12** is coupled to ROM **14** by a unidirectional data bus **28**. ROM **14** contains the basic operating system for the pen-based computer sys-